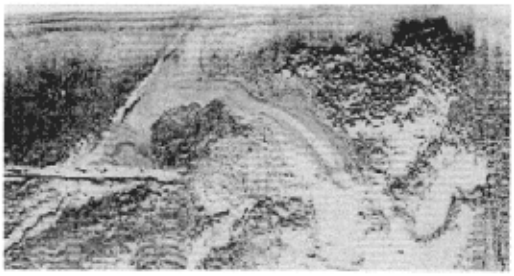
OCEAN SURVEYS, INC.

OSI

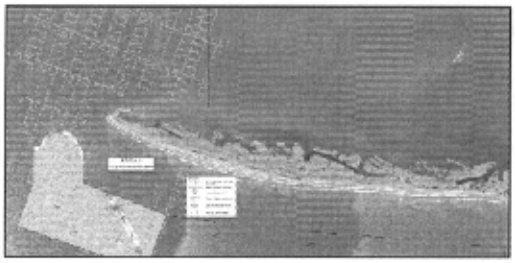
Geophysical Surveys

Geophysical surveys efficiently map seabed morphology and sub-bottom stratigraphy, often resulting in substantial project cost savings. Remote sensing systems utilized by our geologists and geophysicists include: seismic reflection and refraction sub-bottom profilers · ground penetrating radar · side scan sonar · marine magnetometer · video supported ROV. Representative applications of geophysical surveyings include:



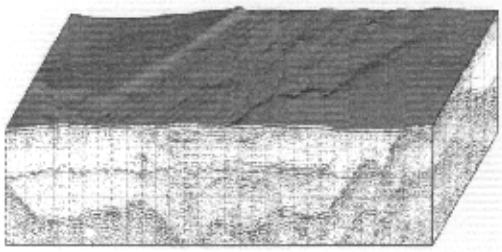
Remediation studies

High-resolution side scan sonar surveys were conducted to monitor for bentonite releases during directional drilling operations. Repetitive side scan sonar and hydrographic cross-sectional surveys are performed over the location of the drill bit during drilling operations. The sonar image to the left shows a release of bentonite, which resulted in an immediate cessation of drilling.



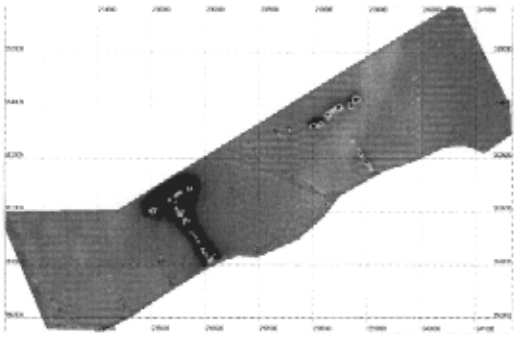
Borrow site investigations

Geophysical surveys supporting borrow site investigations often include subbottom profiling. At the Timbalier Island sites, magnetometer data were collected to identify pipelines and other ferrous objects that are present in the candidate borrow sites.



Pipeline and cable route investigations

Sub-bottom profiling supporting dredging and linear siting projects provide regional subsurface information that is used to strategically identify core and boring locations. The use of the geophysical data affords a more comprehensive understanding of the local geological environment than geotechnical samples alone can provide.



Marine terminal design

Comprehensive marine geophysical surveys for marine terminal design include magnetic surveys to identify pipelines, cables and remnant structures from older facilities. (The lower left anomaly is from an existing operational structure while the anomaly in the upper right is related to the remains of an older removed structure).

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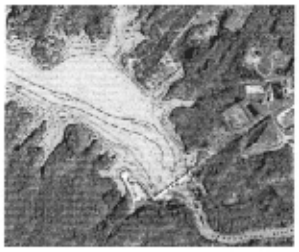
OCEAN SURVEYS, INC.

OSI

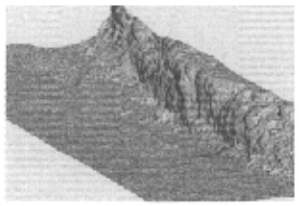
Hydrographic Surveys

Automated hydrographic surveys precisely chart underwater topography. OSI employs the following technologies for this purpose: GPS vessel positioning · computerized navigation and data logging · single and dual frequency depth sounding · multibeam sonar · towed sea sled profiling. Representative hydrographic surveys include:



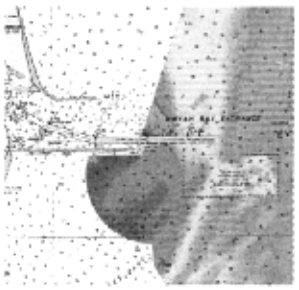
Lake Chesdin, Petersburg, Virginia

Ocean Surveys performed an extensive hydrographic survey of Lake Chesdin, located on the Appomattox River near the City of Petersburg, VA. OSI utilized a DGPS controlled hydrographic survey vessel, equipped with a single-beam digital depth sounder, and computer navigation and data logging system. A total of 500 survey transects were run to generate capacity computations accurate to within 3-4%.



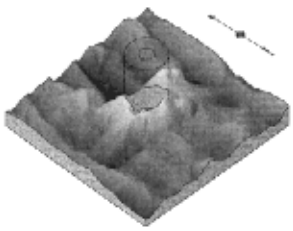
Detroit River Rock Cut Inspection – Detroit, MI

For the Detroit District of the US Amry Corps of Engineers, Ocean Surveys performed a multibeam hydrographic survey in the Detroit River. The objective of the survey was to inspect the side walls of the rock cut channel and identify pieces of rock which had fallen from the walls and became obstructions to navigation.



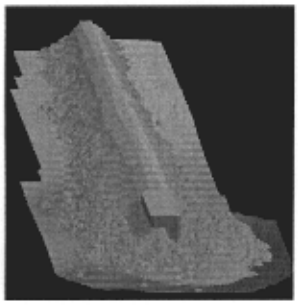
Winyah Bay Entrance – Georgetown, SC

During the period October 1999 – October 2001, Ocean Surveys provided the National Oceanic & Atmospheric Administration (NOAA) with multibeam hydrographic and side scan sonar surveying services to support NOAA coastal charting responsibilities throughout the southeast United States. Under this contract, OSI surveyed a 5 x 5 mile area adjacent to Winyah Bay Entrance, South Carolina. Following completion of this delivery order, Ocean Surveys was awarded an overall rating of "Excellent."



Mackinac Bridge – Straits of Mackinac, MI

The Mackinac Bridge, constructed during 1954-57, is the ninth largest suspension bridge in the world. It has a total length of five miles and a main span of 3800 feet. In September 2000, Ocean Surveys, Inc. (OSI) conducted a multibeam hydrographic survey around thirty (30) Mackinac Bridge piers to determine water depth and scour activity.



Lake Michigan – WI & MI

As part of a Detroit District program to periodically evaluate the condition of shoreline protection structures, OSI was contracted to conduct multibeam surveys of a total of eleven breakwaters along the shores of Lake Michigan in both Wisconsin and Michigan. The specific objectives were to identify structural failures in the breakwaters and erosional features, which might indicate a risk to their stability. Ocean Surveys' performance on this contract resulted in an ACASS rating of "excellent."

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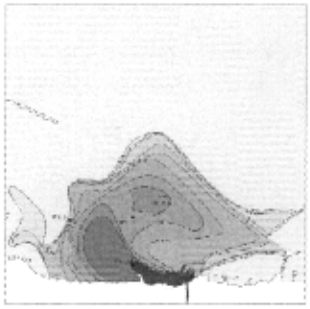
OCEAN SURVEYS, INC. OSI

Oceanographic Monitoring

Ocean Surveys' diversified inventory of oceanographic and environmental instrumentation enables us to respond rapidly to client requirements. We routinely monitor: current velocity · wave height and direction · water level and tide · dissolved oxygen · conductivity and salinity · temperature · pH · turbidiy · surface and bottom drift · wind velocity · barometric pressure. Representative oceanographic monitoring projects include:

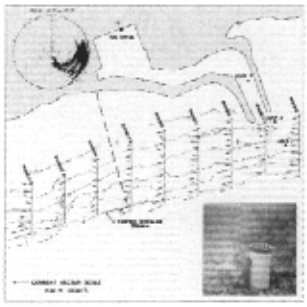


Dye Dilution Study – Alexandria, Egypt

As part of a year-long multidisciplinary program, Ocean Surveys conducted a dye dilution study in the Mediterranean Sea off Alexandria, Egypt. The survey consisted of a 12-hour batch release of fluorescent dye into the 1 billion gallon per day discharge, followed by five daily plume mappings to document the temporal and spatial movements of the dye plume. The data were used by Metcalf & Eddy International, Inc. as input for their numerical modeling program to assess the suitability of the local Mediterranean Sea as receiving water for a proposed wastewater outfall.

Thermal Plume Mapping – Bridgeport, CT

Ocean Surveys performed a detailed field investigation to determine the location and extent of the discharge plume emanating from The Bridgeport Energy Power Generating Station. OSI installed in situ instruments to document the varying currents, water elevation, and water temperatures and conducted six synoptic thermal mappings timed to coincide with the occurrence of significant tidal flow conditions at the project site. Bridgeport Energy, LLC used the resulting data set to create a dynamic model of the plume for use in their discharge permit renewal application.



Current & Wave Monitoring – South Riding Point, Bahamas

Ocean Surveys conducted an oceanographic and atmospheric data collection program in support of El Paso Energy's engineering analysis of a proposed LNG terminal. Using state-of-the-art Doppler technology, Ocean Surveys collected a wide variety of data for the project including: 90 days of Acoustic Doppler Current Profiler (ADCP) current velocity and directional wave data, 90 days of meteorological data, two 13-hour tidal cycle CTD density structure mappings, and one 13-hour vessel-mounted ADCP current velocity mapping.

Ocean Outfall Monitoring – Ponce, PR

As part of an ongoing study, Ocean Surveys provides water quality monitoring services to Malcolm Pirnie, Inc. in support of their 301(h) Waiver and Mixing Zone Validation Study offshore of Ponce, PR. Services routinely provided include: "clean techniques" water sampling using hyper-accurate underwater navigation systems, ADCP current velocity monitoring, CTD vertical profiling, benthic sediment grab sampling, and ROV pipeline inspection. The Malcolm Pirnie/Ocean Surveys effort is aimed at securing a permanent 301(h) waiver for the Ponce outfall.

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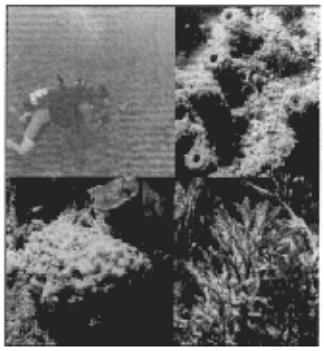
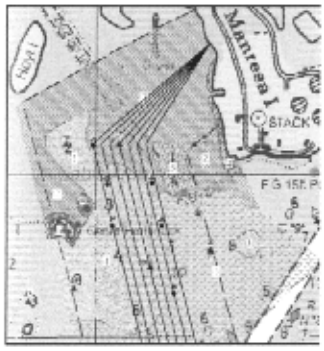


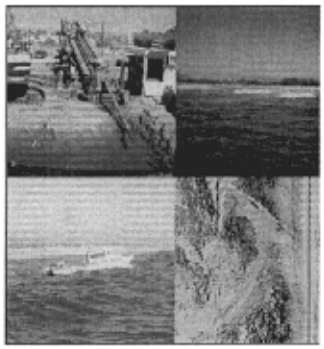
Benthic Habitat Delineation – Dorado PR

Ocean Surveys mapped the various benthic habitats in the vicinity of a proposed ocean outfall off Dorado, PR in support of Black and Veatch, Inc.'s 301 (h) waiver program. Using a variety of remote sensing and real-time data collection techniques including side scan sonar mapping, underwater videography, diver reconnaissance, diver quadrat surveys, as well as sampling of plankton, demersal finfish, and benthic organisms, OSI documented both the benthic habitats present in the area and the biological community assemblages present in each habitat unit. Additionally, the ambient current regime was documented with several ADCPs and drogues.



Benthic Habitat Delineation – Norwalk, CT

Ocean Surveys mapped the various benthic habitats along the Connecticut Light and Power Company's sub-sea cable corridor off Norwalk, CT. Using a variety of remote sensing and real-time data collection techniques including side scan sonar mapping, underwater videography, benthic sediment grabs, diver reconnaissance, diver quadrat surveys, and visual intertidal inspection, OSI documented the benthic habitats present in the area as well as the biological community assemblages present in each habitat unit. Additionally OSI identified and enumerated commercially important shellfish populations present in order to further document potential impacts of the proposed cable replacement.



Directional Drill Monitoring – Pismo Beach, CA

Tyco Submarine Systems landed three trans-Pacific fiber optic cables using horizontal directional drilling at Pismo Beach, CA with the benefit of OSI's bentonite release monitoring system. Using customized remote sensing techniques, Ocean Surveys helped Tyco satisfy California State permit requirements for undersea directional drilling. The Ocean Surveys field team detected bentonite drilling fluid releases in real time, which allowed Tyco to immediately take corrective action resulting in greatly reducing impact to the benthic ecosystem and minimizing project costs..

Riverbed Monitoring – Green Bay, WI

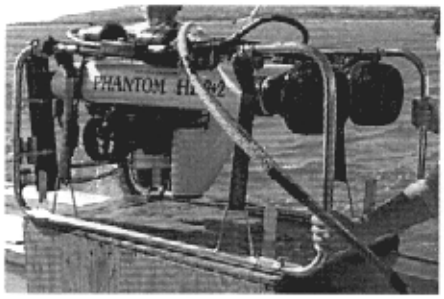
Working in Operating Unit 3 (OU-3) on the Fox River, Ocean Surveys completed a 3-month precision current velocity and sediment bed load monitoring program. OSI deployed two diver-installed monitoring stations on the riverbed each consisting of SonTek Acoustic Doppler Velocimeters (ADV), OBS turbidity sensors, and sediment bed load traps. Data from the project were used to calibrate models of contaminated sediment movement through OU-3.

OCEAN SURVEYS, INC.

OSI

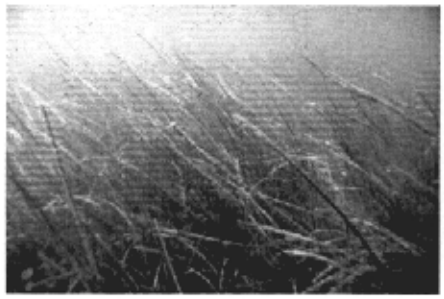
Remotely Operated Vehicle

Augmenting our core group of services, Ocean Surveys also performs underwater inspections using a Remotely Operated Vehicle (ROV). Applications of Remotely Operated Vehicles include: inspection of underwater structures · marine archaeological investigations · benthic habitat documentation.



Deep Ocean Engineering Phantom HD2

The Deep Ocean Engineering Phantom HD2 is a lightweight, yet extremely capable ROV system featuring laser rulers, sediment blasters and color video. It also accommodates various manipulators and sonars allowing collection of precise data to a depth of 1,000 feet (300 meters). Underwater videography is collected using the Phantom's built-in wide-angle color camera. All video data is recorded and displayed in real time on a color monitor onboard the survey vessel.

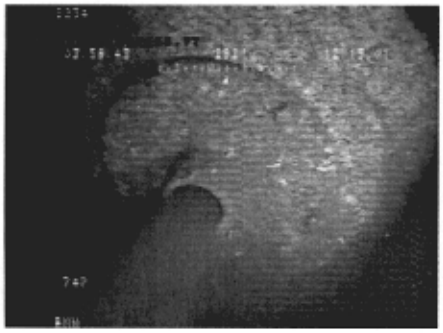


Benthic Habitat Documentation

OSI often utilizes ROV underwater videography in concert with a variety of remote sensing and real-time data collection techniques including side scan sonar mapping, benthic sediment grabs, and diver quadrat surveys to document benthic habitat. Benthic studies typically document the habitats as well as the biological community assemblages present within each habitat unit.

Target Identification (Marine Archaeology)

During side scan sonar and marine magnetometer surveys it is sometimes necessary to perform video inspection of recorded unidentified targets. Often times, constraints such as water depths, strong currents, and limited time prohibit the use of divers to perform the inspection. The Remotely Operated Vehicle provides an ideal resource for vessel controlled video documentation during these circumstances.



Underwater Structure Inspection

As part of an ongoing study, Ocean Surveys provided water quality monitoring services to support a 301(h) Waiver and Mixing Zone Validation Study offshore Ponce, PR. OSI employed the ROV to collect video data along the entire length of the outfall structure, paying particular attention to the six diffuser risers and the manways along the length of the pipe. OSI's underwater navigation system merged with the vehicle's internal fluid gimbled fluxgate compass provided extremely accurate sub-meter positioning during all phases of ROV operations.

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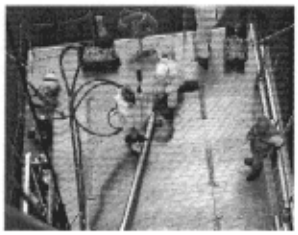
Sediment Sampling and Imagery

Ocean Surveys provides vibratory, gravity and piston coring services to obtain continuous samples of unconsolidated sediment. All field personnel have 40-hour OSHA Health and Safety certification for sampling operations involving hazardous materials.

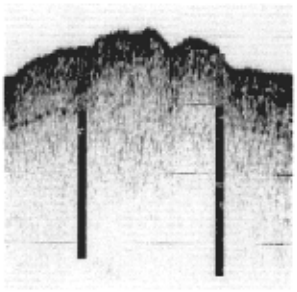
Shallow Water Coring Platforms

The image at left depicts Ocean Surveys' 36' x 16' pontton boat alongside a 20' support vessel. "Candu" features sections which fold up for trailering, a 4' x' 5' moon pool through which sampling or measurement equipment are lowered, and a tower assembly for handling vibratory corers and other devices. "Candu" is capable of 15 knot speed and has a 75-mile operating range. OSI also owns two smaller shallow water pontoon boats for sediment core sampling. These platforms measure 28' x 8' and 24' x 8', respectively.



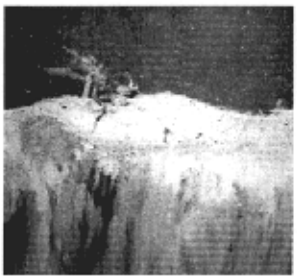
OSHA 40-hour Health & Safety Certification

This photograph was taken during a project requiring OSHA, Modified Level D Health & Safety protocol. All OSI field personnel have 40-hour Health & Safety certification. The operators are in the process of removing a sediment core sample contained within a Lexan tube from the core barrel housing. The image at left shows the working platform aboard "Candu." The hinged side sections are clearly visible.



Correlating Physical and Remote Sensing Data

The image at left is from the Boston Harbor Navigation Improvement Project – a US Army Corps of Engineers funded program involving monitoring and improving the use of Contained Aquatic Disposal (CAD) cells as an alternative for contaminated sediment management. Following survey and coring operations, photographs of the split core samples were superimposed on the seismic reflection record to further identify the thickness of the placed sand cap overlying the contaminated dredged material.



Sediment Profile Imaging

Ocean Surveys employs a Sediment Profile Imaging (SPI) Camera during projects requiring the documentation of benthic habitat within the upper 20cm of sediment. In operation, the camera is lowered to the bottom and is externally triggered upon contact, releasing the prism housing and camera, which penetrate into the sediment. The knife-like edge on the bottom of the prism combined with the weight of the camera allows the prism to cut a vertical slice into the upper sediments.

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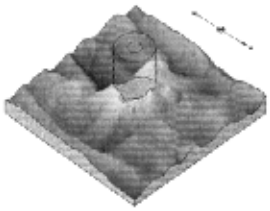
OCEAN SURVEYS, INC.

OSI

Marine and Freshwater Site Surveys

Ocean Surveys, Inc. (OSI) was founded in 1965 to provide industry and government with the technical expertise to acquire and interpret scientific data from both marine and freshwater environments. Company headquarters and OSI's Eastern Regional headquarters are located in Old Saybrook, Connecticut. A Midwest office is located in Northbrook, IL, and a Southeast office is located in the Research and Technology Park on the campus of the University of New Orleans.



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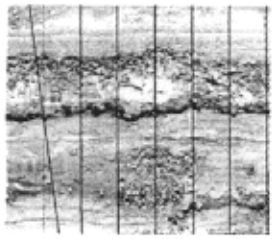

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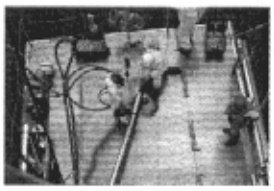

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Oceanography & Limnology

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7. Brief resume of key persons, specialists, and individual consultants anticipated for this project:

a. Name & Title:
George G. Reynolds
Vice President, Hydrographic Section Manager

b. Project Assignment:
Program Manager

c. Name of Firm with which associated:
Ocean Surveys, Inc.

d. Years experience: With This Firm 27.0 With Other Firms 4.0

e. Education: Degree(s) / Year / Specialization
E.E. / 1973 / Electronics, Goodwin Tech., New Britain, CT
A.S. / 1966 / Electronics, Hartford State Tech. College

f. Active Registration: Year First Registered / Discipline
ACSM Certified Inshore Hydrographer (#183), 1995
Health and Safety Certified (29 CFR 1910.120 & 1926.65)

g. Other Experience and Qualifications relevant to the proposed project:

Mr. Reynolds, OSI Vice President and Hydrographic Section Manager, oversees all hydrographic survey activities and provides logistical support for field activities, schedules survey personnel and equipment, and supervises project mobilization/demobilization. Since joining OSI in 1975, he has participated in or managed more than 1,000 hydrographic and marine geophysical survey projects. Mr. Reynolds also reviews all hydrographic survey products as part of OSI's QA/QC program.

Mr. Reynolds has over twenty years experience in the design, calibration, operation and maintenance of hydrographic survey and navigation electronics. He has either participated in or has managed all multibeam hydrographic surveys performed by OSI to date. In addition to this project experience, he coordinated multibeam demonstrations for New York, Philadelphia, Detroit and Vicksburg (CERC) US Army Corps of Engineers.

REPRESENTATIVE PROJECTS:

Cape May & Ocean City, NJ and Indian River Inlet, DE – Program Manager for beach profiling surveys using towed sea sled; contract to Philadelphia District, US Army Corps of Engineers (USACE).

Indian River Inlet, DE – Program Manager for multibeam hydrographic surveys performed for the Philadelphia District, USACE to support beach replenishment and surficial and subsurface investigations of the inlet, jetties, and riprap, respectively.

Wilmington, NC – Program Manager in charge of coordinating all planning, field and data analysis for the Wilmington District, USACE. This project involved extremely challenging hydrographic surveys of both inland reservoirs and coastal project sites and resulted in an "Excellent" ACASS performance evaluation and a Certificate of Appreciation from the District Engineer.

New York, NY – Program Manager in charge of coordinating all planning, field and data analysis for the New York District, USACE. The work involved multiple multibeam hydrographic surveys of inlet jetty structures along the southern shore of Long Island, NY.

Chicago District – Program Manager in charge of coordinating all planning, field and data analysis for the Chicago District, USACE Indefinite Delivery Type Contract for single- and multibeam hydrographic, and side scan sonar surveying services.

Southeast US – Program Manager in charge of coordinating all planning, field surveys and hydrographic data analysis for NOAA. Contract is a two year assignment to conduct multibeam hydrographic surveys in the southeast US to support NOAA's nautical charting efforts.

Detroit, MI – Program Manager in charge of coordinating all planning, field and data analysis for the Detroit District, USACE Indefinite Delivery Type Contract for single- and multibeam hydrographic surveying services.

R.J. Diaz & Daughters
6198 Driftwood Lane
Ware Neck, VA 23178
804 815-2252

August 15, 2005

To: Tim Iannuzzi
From: Robert J. Diaz, President

I am providing this information in response to your quire to sediment profile imaging in Newark Bay.

R.J. Diaz & Daughters is a small minority owned business that specializes in environmental assessment in estuarine and marine systems, from intertidal to deep channel to coastal habitats (http://www.courses.vcu.edu/ENG-esh/). We have extensive experience monitoring environmental effects and changes in benthic habitats, especially disturbance related to channel dredging activities, and in assessing and mapping relative resource value of benthic habitats. We have developed specialized techniques for rapid turn-around of benthic impact assessments, including the collection and interpretation of data using sediment profile and surface cameras. Additionally, R.J. Diaz & Daughters has been instrumental in the development of color image analysis techniques for sediment profile images and small lightweight camera systems. We have developed methods for evaluating benthic habitat quality and changes to the resource value of benthic habitats and for mapping biological and geological gradients.

(1) Experience in conducting SPI surveys at dredged material disposal sites:

Listed are major projects involving dredged material and SPI. Points of contact are given at the end of each study:

Benthic habitat classification of potential open water disposal areas in Narragansett Bay, Rhode Island. P.I. and principle author of interpretive report for a sediment profile image (SPI) survey to characterize benthic habitats in 21 areas of Narragansett Bay and the Providence River selected by the New England Corps of Engineers as possible or existing disposal areas. The classification of stations into habitats was done "blind" without regard for area or station location prior to analysis. Initially, all images were evaluated and a basic habitat classification set-up. Four basic habitats with a total of nine subhabitat types were defined. A total of 211 stations were classified into the nine-habitat/subhabitat categories.
For New England District via Normandeau Assoc, Ann Pembroke (603) 472-5191 x169

Sediment profile camera reconnaissance of benthic habitats at a Cape Cod Bay disposal site. P.I. responsible for a SPI camera survey of an open water disposal site in Cape Cod Bay to document existing conditions and authored an interpretive report on existing conditions and long-term changes. Benthic habitats within the disposal area were compared to previous surveys and found to be similar in physical and biological properties between 1985 and 1994, based on sediment profile camera surveys. The benthic habitat quality present at the disposal site appeared to be very high. The general benthic habitat conditions may have actually improved

from 1985 to 1994. Average Organism Sediment Index and successional stage were higher in 1994 than 1985. The depth of the Macrofaunal Activity Zone, an indication of the layer of sediment that is actively mixed by the infauna, was about 10 cm. This would indicate that disposal of any contaminated material at the site would have to be thickly capped to prevent mobilization of contaminants.

For New England COE, DAMOS via ENSR, James Blake, (508) 457-7900 x222, JBlake@ensr.com

Benthic Habitat Mapping of NJ/NY estuarine and coastal areas using sediment profile cameras for formulation of long-term dredged material disposal plans. P.I. for SPI camera surveys that included over 700 stations in the estuarine and coastal areas around Raritan, Upper, Lower, Newark, and many other small bays in the region. In charge of image analysis and interpretation. The goal of these surveys was to document existing benthic habitat conditions and provide detailed maps delineating benthic habitats. Based on analysis of the sediment profile camera data the benthic habitats in the region were diverse and range from low dissolved oxygen stressed to well-developed successional stage III communities. Based on the SPI and benthic data habitat maps were generated using GIS and criteria developed for assessing suitability of an area as a potential disposal site.

NOAA, Coastal Services Center, Charleston, SC, Pace Wilber, (843) 740-1234

Sediment profile camera surveys of the Gulf of Mexico open water underwater berm disposal area. P.I. for the sediment profile camera surveys at an underwater berm that was constructed from dredged material from the deepening of the Mobile ship channel. The berm was designed to provided subtidal habitat for the areas fisheries resources. Over a period of time that ranged from during construction to one-year post construction Dr. Diaz, with scientists from the Waterways Experiment Station, surveyed a series of stations on and around the berm with a sediment profile camera. A complete analysis of the sediment profile images was done to follow the recovery of the fauna. Reworking of the dredged material was also followed with the profile camera. The client then took the data generated and incorporated them into reports on the impacts of berm construction and on the evaluation of the resource value of the berm. The data from the sediment profile camera was also used to locate stations for collection of quantitative macrofaunal samples. Knowing the areas that had different sediment types saved considerable effort. The spread of dredged material away from the berm was also followed the sediment profile camera. Impacts on the surrounding communities were estimated from the profile images.

Waterways Experiment Station, Douglas Clarke, 800 522 6937 13770, Douglas.G.Clarke@erdc.usace.army.mil

Sediment profile camera surveys of the Galveston Bay open water disposal areas. P.I. for the sediment profile camera surveys at the open water disposal areas used for the deepening of the Galveston ship channel. Dr. Diaz, with scientists from the Waterways Experiment Station, surveyed the sites with a sediment profile camera. A complete analysis of the sediment profile images was done to follow the recovery of the fauna and reworking of the dredged material. The data from the sediment profile camera was also used to locate stations for collection of quantitative macrofaunal samples.

Waterways Experiment Station, Douglas Clarke, 800 522 6937 13770, Douglas.G.Clarke@erdc.usace.army.mil

Sediment profile camera surveys of the Corpus Christi Bay open water disposal areas. P.I. for the sediment profile camera surveys at the open water disposal areas used for the deepening of the Corpus Christi ship channel. Dr. Diaz, with scientists from the Waterways Experiment Station, surveyed the sites with a sediment profile camera. A complete analysis of the sediment profile images was done to follow the recovery of the fauna and reworking of the dredged material. The data from the sediment profile camera was also used to locate stations for collection of quantitative macrofaunal samples.
Waterways Experiment Station, Douglas Clarke, 800 522 6937 13770, Douglas.G.Clarke@erdc.usace.army.mil

Settlement of hopper overflow from test channel dredging operations in Delaware Bay. P.I. and principal author of interpretive report on thin-layers of sediment resulting from hopper dredge overflow. Dr. Diaz used SPI to detect the deposition of thin layers of dredged material from barge overflow operations at two area in Delaware Bay. Results indicated the lower bay site (LB) was more physically accommodated than the upper bay site (UB), which was more biologically accommodated. There was evidence that recent physical disturbance had occurred at several of the LS stations possibly from the dredging operations. Gray colored suspended material, indicative of hopper overflow material, was also observed at two stations. In the US area no evidence of recent physical disturbance was detected at any of the stations, but material that could have come from the hopper overflow was observed at one station. Evidence of hydrocarbon contamination was seen at one UB station in the form of "Oil Spots". Diaz et al. (1993, citation in SPI related section) found that sediments containing high concentrations of hydrocarbons had a unique signature in the SPI images and that this signature was significantly related to the occurrence of hydrocarbons.
For Philadelphia District COE via Versar, William Burton, (410) 740-6086, burtonwil@versar.com

Chesapeake Bay/Baltimore channel deepening impacts. P.I. and principal author of interpretive report of this field project, which was a multi-disciplinary program designed to collect data for: 1. Determining the most environmentally suitable locations for placement of dredged material from the deepening of the main ship channel to Baltimore. 2. Evaluation of acute impacts from disposal. 3. Follow long-term recovery of benthic resources. An extensive database on benthic habitat characteristics, benthic community structure, and fish habitat utilization was collected from the main stem of the Bay. This project was funded at a level of about one million dollars and spanned a period of 10 years with close to a thousand box-core samples and over 5,000 SPI images collected.
Baltimore District, COE, Robert Blama, 410 962-6068, robert.n.blama@nab02.usace.army.mil

Anacostia River active capping technology monitoring. P.I. and principal author of interpretive report of this field project to monitor the performance of new innovative capping and in-situ treatment technologies. The Hazardous Substance Research Center/South and Southwest (HSRC) at Louisiana State University, is conducting comparative validation of innovative

"active capping" technologies in the Anacostia River, Washington D.C. The goal of the cap is to ensure contaminants that migrate through the cap are absorbed, chemically bound, or degraded and not released into the water column. Three areas in the Anacostia River have been selected for the field demonstration with SPI used to assess cap thickness and integrity.
For Navy/EPA via Battelle, Andrew Bullard, bullarda@battelle.org

Benthic sampling of the nearshore area off Brunswick Harbor, Georgia. P.I. of SPI component and principal author of interpretive report. This study documented and mapped broad-scale benthic habitat conditions in and around potential open-water disposal sites.
For Savannah District COE via Barry A. Vittor and Associates, Mobile AL, Barry Vittor, (251) 633-6100

SPI Survey of Boston Harbor Navigational Improvement Project Confined Aquatic Disposal (CAD) Cells. P.I. responsible for a SPI camera survey of eight CAD cells in the Boston Harbor area and principal author of the interpretive report. Four years after the CAD cells were capped physical properties of the surface sediments may have reverted to background conditions with the apparent disappearance of the sand cap material. Geochemical properties appear to have remained the same with sediment color and apparent color RPD layer depth relatively similar between years. Benthos appear to still be in a recolonizing phase, which is likely related to the physically stressful nature of area within which the CAD cells are located.
For New England COE, DAMOS, via ENSR, James Blake, (508) 457-7900 x222, JBlake@ensr.com

Dredged material disposal site evaluation, SPI survey of Areas E and W, Rhode Island Sound. P.I. responsible for fieldwork to collect sediment profile camera images, analysis and interpretation of data, and writing the interpretive report. Data from multi-beam acoustics were incorporated in the interpretation of habitat conditions. The general sedimentary characteristics of Area E and W were similar with large patches of coarse sediments surrounded by finer sediments. Sediment types ranged from cobble to fine-sand with some silt at both Areas. Sediments at both Areas also had a similar sediment fabric with most finer sediment stations dominated by biological processes. Area E showed no signs of sediment layering. But in Area W two stations (W15 and W17) had thin layers of finer sediments that could have been related to recent sediment disturbance. In August 2003, Area E and to a lesser degree Area W appeared to be dominated by biological processes with biogenic features such as feeding pit and defecation mounds common. Biogenic activity of advance successional Stage III communities was a predominant factor in structuring both surface and subsurface sediments in Area E. Area W fauna appear to be advancing successionally relative to previous years. It did not appear that sediments at any station in Area E or W were impacted by organic enrichment. Sediments underlying the apparent color RPD layer were light gray in color. Overall, benthic habitat conditions at both Area E and W, as measured by the OSI and other SPI parameters, appeared to be good with the only signs of stress to the benthos being physical forces such as sediment instability. The apparent high quality of the benthic habitats was primarily a function of the deep dwelling infuana and their associated biogenic activities. Benthic habitats in Area E appeared to have higher quality compared to those in Area W.
Corps of Engineers, New England Division, Concord, MA, Michael Keegan, (978) 318-8220

(2) Published studies of marine benthic community dynamics and the response of benthic communities to the habitat change resulting from dredged material disposal and other forms of disturbance:

Dredging Related:

Diaz, R. J., G. R. Cutter, Jr. and C. H. Hobbs. 2004. Potential impacts of sand mining offshore of Maryland and Delaware: Part 2 –biological considerations. Journal of Coastal Research. 20:61-69.

Clarke, D., R.J. Diaz and R. Blama. 2003. Monitoring dispersion of dredged material following riverine deep trough disposal. Proceedings Dredging '02. Am. Soc. Civil Engin.

Nichols, M.M., R.J. Diaz and L.C. Schaffner. 1990. Effects of hopper dredging and sediment dispersion, Chesapeake Bay. Environ. Geol. Water Sci. 15:31-43.

SPI Related:

Diaz, R.J., L.J. Hannsson, R. Rosenberg, P. Gapcynski and M. Unger. 1993. Rapid assessment of sedimentological and biological characteristics of a hydrocarbon pollution gradient. Water, Air and Soil Pollution 66:251-266.

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Rosenberg, R., H.C. Nilsson and R.J. Diaz. 2001. Response of Benthic Fauna and Changing Sediment Redox Profiles over a Hypoxic Gradient. Estuarine and Coastal Shelf Sci. 53:343-350.

Cutter, R.G. and Diaz, R.J., 2000. Biological alteration of physically structured flood deposits on the Eel margin, northern California. Continental Shelf Research. 20:235-253.

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Boyer, L.F., R.J. Diaz, and J.D. Hedrick. 1988. Computer image-analysis techniques and video-sediment-profile camera enhancements provide a unique and quantitative view of life at or beneath the sediment-water interface. Oceans'88. 2:448-453.

Benthic Related from 1990 to present:

Diaz, R. J., M. Solan, and R. M. Valente. 2004. A review of approaches for classifying benthic habitats and evaluating habitat quality. Journal of Environmental Management. 73:165–181.

Diaz, R. J., J. Nestlerode, and M. L. Diaz. 2004. A global perspective on the effects of eutrophication and hypoxia on aquatic biota. In: Proceedings of the 7th International Symposium on Fish Physiology, Toxicology, and Water Quality, Tallinn, Estonia, May 12-15, 2003, G. L. Rupp and M. D. White (eds). U.S. Environmental Protection Agency, Ecosystems Research Division, Athens, Georgia, USA. EPA 600/R-04/049, pp 1-33.

Diaz, R. J. 2004. Biological and physical processes structuring deep-sea surface sediments in the Scotian and Weddell Seas, Antarctica. Deep-Sea Research II 51:1515-1532.

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Diaz, R.J. and R. Rosenberg. 2001. Overview of anthropogenically induced hypoxic effects on marine benthic fauna. P. 129-145. In: N. Rabalias and G. Turner (eds.) Hypoxia and the Gulf of Mexico, AGU Press.

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Llanso, R.J. and R.J. Diaz. 1994. Tolerance to low dissolved oxygen by the tubicolous polychaete Loimia medusa. J. Mar. Biol. Ass. U. K. 74:143-148.

Diaz, R.J. and C. Erséus. 1994. Habitat preferences and species associations of shallow-water marine Tubificidae (Oligochaeta) from the barrier reef ecosystems off Belize, Central America. Hydrobiologia 278:93-105.

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Olsen, C.R., I.L. Larsen, P.J. Mulholland, K.L. VonDamm, J.M. Grebmeier, L.C. Schaffner, R.J. Diaz, and M.M. Nichols. 1993. The concept of an equilibrium surface applied to particle sources and contaminant distributions in estuarine sediments. Estuaries 16:683-696.

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Diaz, R.J., R.J. Neubauer, L.C. Schaffner, L. Phil and S.P. Baden. 1992. Continuous monitoring of dissolved oxygen in an estuary experiencing periodic hypoxia and the effect of hypoxia on macrobenthos and fish. Sci. Total Environ. Supplement 1992:1055-1068.

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ROBERT J DIAZ

EDUCATION

Ph.D. Marine Science, University of Virginia, 1977
M.S. Marine Science, University of Virginia, 1971
B.A. Biology and Chemistry, La Salle College, 1968

ACADEMIC POSITIONS

1996-	Professor, College of William and Mary, Virginia
1984-96	Associate Professor, College of William and Mary, Virginia
1978-84	Assistant Professor, College of William and Mary, Virginia
2001-	Adjunct Professor, Old Dominion Univeristy, Virginia

HONORS, PRIZES AND AWARDS

Doctor Honoris Causa from Gothenburg University, Sweden, 1996
President of the Atlantic Estuarine Research Society, 1994-1995
Executive Board Member, Estuarine Research Federation, 1994-1995
Listed in Who's Who Among Hispanic Americans

Project Experience

Dr. Diaz has over 35 years of experience working with marine, estuarine, and tidal freshwater benthic communities. He has specialized in the assessment of change, both natural and anthroprogenic, to systems and has developed several nationally used methods for evaluating benthic habitats and identifying benthic resource value. He is also internationally recognized as an expert in benthic habitat assessment and interpretation of sediment profile camera images. He has extensive field experience, along the Atlantic and Gulf of Mexico coasts monitoring and documenting environmental effects and impacts from; dredging and dredged material disposal, contaminated sediments, both hydrocarbons and heavy metals, and eutrophication and low dissolved oxygen. His experience spans all habitat types form the intertidal to the deep-sea. He worked closely with Corps personnel, both form the New York District and Waterways Experiment Stations, to collect and interpret much of the preliminary data for dredging activities around New York City.

Dr. Diaz has worked with ENSR scientists on many projects in the northeast region, including Corps of Engineers DAMOS Projects, the MWRA long-term monitoring of Boston Harbor and Mass. Bay, and pipeline projects in New York and Connecticut. He was also the principal scientist responsible for interpretation of effects on the benthos of the Cross Sound Cable, Long Island Sound, and the HubLine pipeline and Northeast Gateway Project in the Boston area.

PEER REVIEWED PUBLICATIONS FOR LAST 10 YEARS

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